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THESIS

APPLICATION OF SYSTEMS ENGINEERING TO UNDERSTAND AND REPLICATE INTERAGENCY COORDINATION IN SUPPORT OF COMBATANT COMMANDS

by

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June 2012

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13. ABSTRACT (maximum 200 words)

This thesis analyzes interagency coordination from a functional and physical architectural perspective utilizing the Systems Engineering process outlined by Dennis Buede in *The Engineering Design of Systems: Models and Methods (2nd ed.)* (2009). The process of interagency coordination is not fully understood and has proven difficult for various U.S. government agencies to replicate. Two examples of successful interagency coordination are used in this analysis: the Joint Interagency Task Force-South (JIATF-South) and Special Operations Forces (SOF) high-value target teams. These two organizations are individually decomposed into their top-level functions and organized by their major physical components. The results of this analysis are applied in the creation of a notional functional and physical architecture for the U.S. European Command's new Joint Interagency Counter-Trafficking Center (JICTC).

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APPLICATION OF SYSTEMS ENGINEERING TO UNDERSTAND AND REPLICATE INTERAGENCY COORDINATION IN SUPPORT OF COMBATANT COMMANDS

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ABSTRACT

This thesis analyzes interagency coordination from a functional and physical architectural perspective utilizing the Systems Engineering process outlined by Dennis Buede in *The Engineering Design of Systems: Models and Methods (2nd ed.)* (2009). The process of interagency coordination is not fully understood and has proven difficult for various U.S. government agencies to replicate. Two examples of successful interagency coordination are used in this analysis: the Joint Interagency Task Force-South (JIATF-South) and Special Operations Forces (SOF) high-value target teams. These two organizations are individually decomposed into their top-level functions and organized by their major physical components. The results of this analysis are applied in the creation of a notional functional and physical architecture for the U.S. European Command's new Joint Interagency Counter-Trafficking Center (JICTC).

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LIST OF ACRONYMS AND ABBREVIATIONS

AOR	Area of Responsibility
C4I	Command, Control, Communications, Computers, Intelligence
CNIES	Cooperating Nations Information Exchange System
COCOM	Combatant Command
COP	Common Operational Picture
DoD	Department of Defense
JIATF-South	Joint Interagency Task Force-South
JICTC	Joint Interagency Counter-Trafficking Center
ONDCP	Office of National Drug Control Policy
SOF	Special Operations Forces
TAT	Tactical Analysis Team
USEUCOM	United States European Command
USSOUTHCOM	United States Southern Command
USSOCOM	United States Special Operations Command

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EXECUTIVE SUMMARY

In 2010, U.S. European Command (USEUCOM) created the Joint Interagency Counter-Trafficking Center (JICTC). This organization is tasked with coordinating interagency efforts to counter illicit trafficking and terrorism in the USEUCOM area of responsibility. However, the process of interagency coordination is not well understood within U.S. government agencies and is difficult to replicate successfully. To assist the JICTC in its continuing formation, this thesis develops a notional functional, physical, and allocated architecture of the JICTC based upon its defined mission and objectives. This is done using the Systems Engineering approach outlined by Dennis Buede in "*The Engineering Design of Systems: Models and Methods (2nd ed.)*" (2009). The general outline of the Buede process is develop an operational concept, define the functional and physical architectures, and integrate both architectures together.

Two successful examples of interagency coordination are used as the basis for creating the functional and physical architecture of the JICTC: the Joint Interagency Task Force-South (JIATF-South) and Special Operations Forces (SOF) high-value target teams. JIATF-South is a multiservice, multiagency national task force based in Key West, FL. It conducts detection and monitoring operations of illicit trafficking in support of law enforcement. SOF high-value target teams were utilized in Iraq during the 2007 surge of American forces. Their mission was to fuse intelligence with operations in order to better identify, track, and defeat the insurgency.

The operational concept describes how a system will be used along with outlining its context and interactions with other external systems. It is the first step of the Buede process in order to later define a system's functional and physical architecture. Operational concepts were developed for both JIATF-South and SOF high-value target teams based on thorough efforts to better understand these organizations through literature review and on-site visits. Systems boundaries were defined and all external systems along with their input/output interactions with JIATF-South and SOF high-value target teams were identified.

The functional architecture of a system is a hierarchical model of the top-level functions required for it to operate as desired. The process of determining the top-level functions of the system is called functional decomposition. JIATF-South and SOF high-value target teams were both functionally decomposed into their respective subfunctions. Based upon these subfunctions and the stated mission requirements of the JICTC, a complete functional architecture of the JICTC was developed. The top-level functions of the JICTC were determined to be:

F.0 - Conduct Interagency Coordination In Support of Efforts to Counter Illicit Trafficking

F.1 – Understand Mission/Objectives

F.2 – Promote Collaboration

F.3 – Maintain Common Operational Picture

F.4 – Allow for Organizational Improvement

In the physical architecture, the resources for every function are identified. Analysis into how both JIATF-South and SOF high-value target teams were physically organized and resourced was conducted. Significant and common components necessary for successful interagency coordination were identified and incorporated into the physical architecture of the JICTC. It was determined that the JICTC should be physically organized by the J-Code structure similar to that of JIATF-South. This structure provided the best possible arrangement for the JICTC to interact effectively with other partner agencies.

The allocated architecture is where the functional architecture is mapped out to the physical architecture. All functions must be mapped to at least one physical component and vice versa. This step in the Buede process verifies that the architecture of the system is complete where all functions have been matched to physical components. The allocated architectures of JIATF-South, SOF high-value target teams, and the JICTC were all verified as complete.

The completed notional functional, physical, and allocated architectures of the JICTC are the result of the application of the Buede Systems Engineering approach as applied to organizations. Specifically, the functional and physical architectures of JIATF-South and SOF high-value target teams were documented using the Buede process. From this, essential functions and components required for successful interagency coordination were identified and applied to the JICTC. The end result was an architecture of an organization that was functionally unique but physically similar to that of JIATF-South.

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I.   INTRODUCTION

A.   PURPOSE OF THESIS

Established by the National Security Act of 1947 and Title 10 of the United States Code, Combatant Commands (COCOM) provide command and control of U.S. Armed Forces in different regions around the world (Executive Office of the President, 2008, p. 1). They are responsible for "utilizing and integrating air, land, sea, and amphibious forces under their commands to achieve U.S. national security objectives while protecting national interests" (Watson, 2011, p. 15). As the primary executors of military policy abroad, COCOMs therefore play an important role in foreign policy. This requires them to interact with other Executive Branch agencies whose individual responsibilities intersect with those of the military (Feickert, 2011, p. 7). This coordination between the different agencies has in the past proved to be challenging due to cross-cultural communications and organizational gaps.

In an attempt to address these needed improvements in interagency coordination, in 2010, U.S. European Command (USEUCOM) created the Joint Interagency Counter-Trafficking Center (JICTC). JICTC's mission is to support the synchronization of interagency efforts to counter illicit trafficking in four main mission areas: narcotics, terrorism, weapons of mass destruction, and human trafficking. The desired end state is to disrupt these trafficking networks and make the USEUCOM area of responsibility (AOR) inhospitable to them (United States European Command, 2010, p. 1).

This thesis develops a generalized functional, physical, and allocated architecture for the JICTC using a Systems Engineering approach. These architectures are developed in order to provide a template for the replication of successful interagency coordination for the JICTC based upon the successful interagency efforts of Joint Interagency Task Force-South (JIATF-South) and the Special Operations Forces (SOF) high-value target teams. In order to more clearly understand the JIATF and SOF organizations, this thesis also develops notional functional and physical architectures for JIATF and SOF high-

value target teams, as well as applying Systems Engineering methods to better understand their operational perspective and system boundaries through the development of external systems diagrams.

B.   BACKGROUND

Tracing its beginnings back to the 1980s, JIATF-South has become the standard to which all other interagency organizations are compared (Munsing & Lamb, 2011b, pp. 1–3). This integrated team is composed of members from the U.S. armed services, federal law enforcement and intelligence agencies, and partner nations.

During the surge of American forces in Iraq in 2007, SOF utilized interagency teams to better identify, track, and defeat the insurgency. These high-value target teams were composed of military members and civilian personnel from a wide variety of government agencies as well as contracting companies.

JIATF-South represents the best example of the long-term evolution of successful interagency coordination (Munsing & Lamb, 2011b, pp. 1–3). However, the way this organization operates is not fully understood and this makes it very difficult to replicate their success elsewhere. On the other hand, the SOF high-value target teams were quickly created to fill an emerging need and capability gap. They became functional within a year of their creation.

Through the development of a generalized functional and physical architecture based on JIATF-South and SOF high-value target teams, this thesis provides a reverse engineered hierarchy of characteristics and capabilities that lead to the determination of a notional interagency coordination process. The development of these architectures is intended to increase understanding of the operations of JIATF-South and the SOF high-value target teams to allow for the application of their successful aspects to other organizations. The generalized architectures are applied to a case-study involving development and analysis of a functional and physical architecture for the new JICTC.

C. RESEARCH QUESTIONS

The following research questions are addressed in this thesis:

1. How can the use of Systems Engineering methods and tools improve interagency coordination?

2. Can Systems Engineering be used to develop a generalized functional and physical architecture of JIATF-South and SOF high-value target teams?

3. How can the use of the generalized functional and physical architecture based on JIATF-South and SOF high-value target teams be applied to the USEUCOM JICTC?

D. SYSTEMS ENGINEERING PROCESS OVERVIEW

The Systems Engineering Process used in this thesis follows the method outlined by Dennis Buede in *The Engineering Design of Systems: Models and Methods (2nd ed.)* (2009). This process allows for the continuous iteration and verification of architectures to be conducted throughout the design process. Each of the different processes is developed separately, but they do follow a sequential order. Specifically, the general outline of the Buede process is develop operational concept, define system architectures, and integrate the architectures together (Buede, 2009, p. 51).

1. Operational Concept

An operational concept is "a vision for what the system is (in general terms), a statement of mission requirements, and a description of how the system will be used" (Buede, 2009, p. 55). By describing how the system will be used, the operational concept begins to outline the system's context and interactions with other external systems. This is done through identifying the system boundary, defining external systems, input/output requirements, and an objectives hierarchy.

2. Functional Architecture

The functional architecture is a hierarchical model of the functions performed by a system. This is accomplished by a decomposition of the top-level functions of the

system. This decomposition is used to identify components and the flow of inputs and outputs that can satisfy the system requirements.

3. Physical Architecture

The various components identified in the functional architecture are further defined in the physical architecture. Here, all of the resources for every function are identified. However, the descriptions are given in generic terms without any specifications or performance characteristics.

4. Allocated Architecture

The results of the three previous processes all come together in the allocated architecture. The allocated architecture is the integration of the requirements decomposition with the functional and physical architectures (Buede, 2009, p. 284). Functions are allocated to components and all requirements can be traced throughout the system. With this complete description of system design, the system is ready for testing.

E. THESIS ORGANIZATION

The Buede process is used as the baseline for the organization of this thesis. Following a review of relevant background literature regarding interagency coordination in Chapter II, Chapter III describes and analyzes the missions of JIATF-South and the SOF high-value target teams. From this, a set of high level mission requirements are derived by applying the Systems Engineering framework to develop an operational concept. From this, a functional architecture is developed in Chapter IV. In Chapter V, the physical architecture is developed by defining the resources needed. These resulting architectures are integrated together in Chapter VI to form a complete proposed architecture of interagency coordination. At each stage of the Buede process, the generated architectures will be applied to develop a notional architecture of the JICTC.

II. BACKGROUND INFORMATION

A. INTERAGENCY COORDINATION INTRODUCTION

The need for an improved understanding of interagency coordination is apparent in today's world, as noted by the RAND Corporation's study on interagency teaming: "Today, we face the problems of terrorism, drug smuggling, proliferation of weapons of mass destruction, trade issue, and other concerns that demand better integration of the instruments of national power" (Johns Hopkins University Applied Physics Laboratory, 2009, pp. 1–5). No single government organization has the resources, ability, or the authority to adequately address every mission area. For example, although the Department of Defense (DoD) has sophisticated capital assets and intelligence gathering capabilities and hardware to conduct detection and monitoring operations, it is banned by the *Posse Comitatus Act* from conducting civilian law enforcement activities (Munsing & Lamb, 2011b, p. 7). Instead, it supports the U.S. Coast Guard and other U.S. federal law enforcement agencies and partner nations with its vast resources and relies on them to conduct actual interdiction and arrest operations. The mechanisms for utilizing the respective agencies with appropriate mission and area expertise is the backbone of interagency coordination and it needs to be better understood.

B. LITERATURE REVIEW

1. Interagency Teaming to Counter Irregular Threats Handbook

In December 2009, The Johns Hopkins University Applied Physics Laboratory published the *Interagency Teaming to Counter Irregular Threats Handbook*. The objective of the handbook was to provide a resource for wide dissemination in the U.S. government that would improve communication and information sharing shortcomings in interagency training (Johns Hopkins University Applied Physics Laboratory, 2009, pp. 1–3). This handbook is designed to provide an introduction to interagency coordination as well as best practices to implement it successfully on the operational level. The handbook provides a very broad look at the interagency team and commonly encountered problems without assuming a specific mission or goal.

Ten best practices were identified by the handbook. They were compiled using a combination of an online survey, interviews, site visits, and literature reviews.

1. Get the right people on the team

2. Establish good external communications

3. Practice cross-cultural communications

4. Keep good records

5. Understand and leverage partner capabilities and expertise

6. Provide adequate resources

7. Manage resources effectively

8. Break down barriers to information sharing

9. Tailor leadership style to the networked team

10. Establish personal working relationships

2.   Joint Interagency Task Force-South: The Best Known, Least Understood Interagency Success

In June 2011, the Institute for National Strategic Studies from National Defense University published a case study on Joint Interagency Task Force-South (JIATF-South). JIATF-South is known throughout the U.S. government as a hallmark example of interagency coordination. However, it is not fully understood how or why this organization works the way it does. The objective of this case study is to closely examine how JIATF-South actually functions. For the purposes of this thesis, the JIATF-South case study is used as the primary reference for creating a notional architecture of interagency coordination.

The case study utilized ten different organizational performance variables while evaluating the success of JIATF-South. These variables were taken from organizational and management literature on cross-functional teams and can be ordered in three different levels: organization, team, and individual. These variables and their definitions are summarized in Table 1.

Level	Variables	Defined
Organization	Purpose	The broad, long-term mandate given to the team by its management as well as the alignment of short-term objectives with the strategic vision and agreement on common approaches within the team.
	Empowerment	Access to sufficient high-quality personnel, funds, and materials, and an appropriate amount of authority that allows for confident, decisive action.
	Support	The set of organizational processes that connect a team to other teams at multiple levels within the organization, other organizations, and a wide variety of resources the team needs to accomplish its mission.
Team	Structure	The "mechanics" of teams—design, collocation, and networks—that affect team productivity.
	Decisionmaking	The mechanisms that are employed to make sense of and solve a variety of complex problems faced by a cross-functional team.
	Culture	The shared values, norms and beliefs of the team—behavioral expectations and level of commitment and trust among team members.
	Learning	An ongoing process of reflection and action through which teams acquire, share, combine, and apply knowledge.
Individual	Composition	What individual members bring to the group in terms of skill, ability, and disposition.
	Rewards	Material incentives and psychological rewards to direct team members towards the accomplishment of the team's mission.
	Leadership	The collection of strategic actions that are taken to accomplish team objectives, to ensure a reasonable level of efficiency, and to avoid team catastrophes.

Table 1.   Performance Variables (From Munsing & Lamb, 2011b, p. 33)

The analysis of these variables helped to identify several key characteristics that were essential to successful interagency coordination at JIATF-South. The following highlights some of the major points observed:

1.   *Purpose*. JIATF-South is focused on illicit trafficking in the Western Hemisphere. While its target set includes weapons of mass destruction, people of national interest, firearms, and money, most of the interagency and partner nation illicit trafficking information is focused on one aspect of combating illegal trafficking – narcotics, specifically cocaine. Every person on the staff understands this mission and supports it fully. The strong shared purpose motivates the team and assists in unifying the efforts of people from different backgrounds, organizational cultures, and experience levels (Munsing & Lamb, 2011b, pp. 34–36).

2. *Empowerment*. JIATF-South is given the authority and resources that it needs to accomplish its mission. By deriving authority from both the Congressional and Executive Branch, JIATF-South not only has the money but also the physical assets (planes, ships, etc.) to produce positive results. Additionally, the different organizational liaisons within JIATF-South are empowered to make decisions that commit the resources of their parent organization. This promotes more initiative and free thinking in the decision making process (Munsing & Lamb, 2011b, pp. 36–41).

3. *Support*. JIATF-South receives support from a number of Washington-based institutions such as the Office of National Drug Control Policy (ONDCP) and the U.S. Interdiction Coordinator. JIATF-South directly supports five Combatant Commands, three U.S. Coast Guard Districts, two U.S. Coast Guard Areas, Drug Enforcement Agency, Customs and Border Protection, Immigration and Customs Enforcement, and other U.S. Federal Agencies in the Western Hemisphere. Additionally, U.S. Southern Command (USSOUTHCOM), JIATF-South's reporting headquarters as directed by ONDCP, provides some support, such as facilities for weapons and unit training. Most notably, JIATF-South does not take credit for any drug seizures. Instead, it gives the credit to partner organizations, knowing that in turn, they will continue to support JIATF-South (Munsing & Lamb, 2011b, pp. 41–46).

4. *Structure*. JIATF-South is organized into different departments based on similar tasks performed (intelligence, operations, logistics, etc.). However, all of these departments are collocated in the same building or even the same floor to facilitate greater productivity and networking. The adverse impact of frequent turnover of agency and military personnel is moderated/mitigated by a force of long-term civilian workforce that brings continuity and institutional knowledge to JIATF-South (Munsing & Lamb, 2011b, pp. 46–50).

5. *Decision making*. Decision making at JIATF-South is based on consensus among JIATF-South and its partner agencies and nations. Any dissenting viewpoints are heard and thoroughly discussed. Although this is a time-consuming method, it brings transparency to the process, ensuring that all partners and agencies feel included (Munsing & Lamb, 2011b, pp. 50–52).

6. *Culture*. Building trust is the key component of the organizational culture at JIATF-South. The organization relies on collaborative and open information sharing in order to be efficient and successful and this is not possible without trust in other team members (Munsing & Lamb, 2011b, pp. 52–56).

7. *Learning*. To keep up with the ever changing tactics of drug traffickers, JIATF-South has to be quick to adapt. With its vast pool of available resources, JIATF-South is able to tap into the strengths of one partner agency to make up for weaknesses in another. For a newcomer, the learning curve is very steep, but there are numerous in-house training programs and standard operating procedures available (Munsing & Lamb, 2011b, pp. 56–59).

8. *Composition*. With its growing reputation, JIATF-South attracts motivated individuals from the military and partner agencies who are team players. These people represent a wide array of backgrounds and diverse skill sets. They bring fresh new ideas to the organization. In addition, the presence of full-time civilians and contractors provides a sense of establishment and discipline that balances out the team (Munsing & Lamb, 2011b, pp. 61–63).

9. *Rewards*. Both individuals and teams at JIATF-South are rewarded for high performance. This recognition may come in the form of career enhancement, monetary rewards, medals, plaques, or letters of recommendation, and especially respect. Job satisfaction is another highly cited reward received while working at JIATF-South (Munsing & Lamb, 2011b, pp. 64–65).

10. *Leadership*. JIATF-South utilizes a shared leadership model. The director of JIATF-South primarily concentrates on external affairs leaving each department working autonomously. Inside each department, authority is placed on the lowest levels possible in order to facilitate rapid decision making (Munsing & Lamb, 2011b, pp. 65–69).

Further analysis suggests that some of the previously mentioned performance variables played a greater role in the success of JIATF-South than others. Namely, interagency organizations should strive to receive a mandate from a higher authority, collaborate to solve problems, know the capabilities of partner agencies, establish a resource base, and build networks. Additionally, top mistakes to avoid while forming interagency teams include segregation of staffs, disrespect for smaller partners, and forgetting to build a culture of trust (Munsing & Lamb, 2011b, p. 85).

3. Secret Weapon: High-value Target Teams as an Organizational Innovation

In March 2011, the Institute for National Strategic Studies from National Defense University published a case study on the use of interagency teams by Special Operations Forces (SOF) in Iraq during the surge of U.S. forces in 2007. The objective of this case study is to help understand and preserve the notion of collaborative warfare by explaining how interagency teams work. Three observed innovations from this study provide a unique insight to interagency coordination in a combat setting:

1. *Network-based targeting*. Terrorists, insurgent cells, and their close supporters were tracked in order to attack them with precision to minimize collateral damage. Additionally, the local environment and its leadership were analyzed using all-source intelligence to gain insight into social networks and mindsets (Munsing & Lamb, 2011a, p. 33).

2. *Fusion of intelligence and operations*. By collocating intelligence and operations groups together, any break between information analysis and action was eliminated. This resulted in better decision making and quicker prosecution of high-value targets (Munsing & Lamb, 2011a, p. 33).

3.   *Counterterrorist-counterinsurgency integration.* The intelligence-fusion cells and high-value target teams located themselves in closer proximity to the enemy network. This reduced the cycle time in which new information was analyzed to identify new targets (Munsing & Lamb, 2011a, p. 34).

The same ten organizational performance variables used in the JIATF-South study were applied to the high-value target teams. Similar examples using high-value target teams were given for each variable.

The case study mentions two other government studies on the high-value target teams in Iraq. A CIA Lessons Learned Center study concluded that the three most important factors in determining interagency collaboration were "a shared vision of the importance of its task, location in a single space, and the shared experiences of its members." Seven factors for success were proposed by the Joint Center for Operational Analysis (Munsing & Lamb, 2011a, p. 35):

1.   a small staff with a high degree of dependence and trust
2.   direct involvement of strategic assets at the tactical level
3.   principals with SOF backgrounds
4.   coordination and collaboration between strategic, operational, and tactical entities
5.   communication
6.   the use of "swarm tactics"
7.   quickly modifiable tactics, techniques, and procedures.

Although the JIATF-South study is not directly comparable with the SOF case study, commonalities among the variables were identified and the organizational performance variables from the JIATF-South study were mapped to the factors for success from the SOF case study as seen in Table 2.

Ten Organizational Performance Variables	Other Identified Factors
Purpose	a shared vision of the importance of its task
Empowerment	direct involvement of strategic assets at the tactical level
Support	
Structure	coordination and collaboration between strategic, operational, and tactical entities
	communication
	location in a single space
Decision making	
Culture	
Learning	quickly modifiable tactics, techniques, and procedures
Composition	principals with SOF backgrounds
	shared experiences of its members
Rewards	
Leadership	a small staff with a high degree of dependence and trust

Table 2.   Mapping of Organizational Performance Variables to Other Identified Factors

III. OPERATIONAL CONCEPT

Before any system can be decomposed into its top-level functions, the mission requirements and purpose of the system must first be understood. This is done through creating an operational concept of the system. This operational concept is the framework of how the system interacts with other external systems in the form of inputs and outputs. By generating the operational concepts of JIATF-South and SOF high-value teams, the system architectures of these organizations can be later defined.

A. JIATF-SOUTH

1. System Boundaries

As specified by its vision statement, "JIATF South will be the center of excellence for all-source fusion and employment of joint, interagency, and international capabilities to eliminate illicit trafficking posing a threat to national security and regional stability" (Joint Interagency Task Force South, 2012). In other words, this system will receive qualitative and quantitative data in the form of intelligence, apply an assessment process, and decide on a course of action. For the purposes of this thesis, JIATF-South serves as the hub for intelligence fusion and coordination of interagency organizations and partner nations. As a result, the other organizations participating in the interagency process are defined as partners, not subordinate agencies under the command of JIATF-South.

2. System Interactions

Interactions between the proposed system and external systems are represented by need lines as shown in the External Systems Diagram in Figure 1. Each line describes an input to or output from the system. The process by which input are transformed into outputs facilitates the desired outcomes of the system.
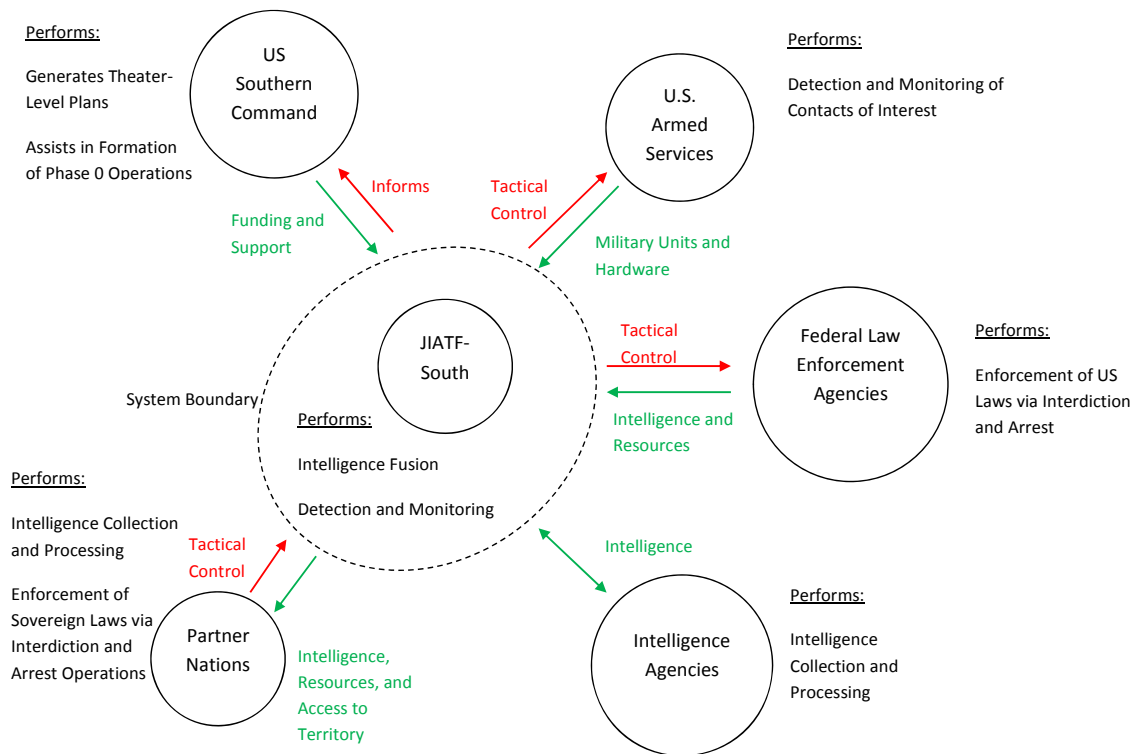
Figure 1.   JIATF-South System Interaction Diagram

a.   *U.S. Southern Command (USSOUTHCOM)*

ONDCP created JIATF-South as a national task force and assigned it to the Commander, USSOUTHCOM. The funding for JIATF-South comes from DoD through USSOUTHCOM. Training support and facilities for JIATF-South are provided by USSOUTHCOM. Overall, USSOUTHCOM manages JIATF-South with a very "hands-off" approach as it is largely self-sufficient.

b.   *U.S. Armed Services*

The armed services, composed of the U.S. Army, U.S. Navy, U.S. Air Force, U.S. Marine Corps, and the U.S. Coast Guard, provide the major hardware needed to support JIATF-South and its partner organizations. Since the military is restricted from directly participating in law enforcement activities by the *Posse Comitatus Act*, they assist via a supporting role capacity under the tactical control of JIATF-South.

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c.   *Federal Law Enforcement Agencies*

Once JIATF-South is confident that a suspect trafficker has been found, they turn tactical control over to law enforcement to conduct the interdiction and arrest as federal law enforcement agencies are the lead organizations to interdict and arrest suspected illicit traffickers. Federal law enforcement agencies have the authority and mandates to find, arrest, and prosecute drug smugglers. JIATF-South is the lead in facilitating open collaboration and coordination between all the individual agencies and for all detection and monitoring operations.

d.   *Intelligence Agencies*

Intelligence gathered for JIATF-South comes from U.S. and partner nation law enforcement, other federal intelligence agencies, or the intelligence branches of the respective U.S. and partner nation military branches. This intelligence is used to create operational plans.

e.   *Partner Nations*

Partner nations provide ships and aircraft to be employed under the direct tactical control of JIATF-South. They provide law enforcement intelligence to U.S. law enforcement agencies, which in turn directly supports JIATF-South's detection and monitoring efforts. They also provide access to sovereign territory and are prepared to accept tactical control of JIATF-South forces for the conduct of interdiction and arrest operations. This increases the effectiveness of JIATF-South and brings the counter illicit trafficking fight closer to the source of the problem.

B.   SOF HIGH-VALUE TARGET TEAMS

1.   System Boundaries

The SOF high-value target teams demonstrated in Iraq that the insurgency could be beaten with organizations and tactics capable of conducting classic counterinsurgency warfare. These teams used interagency innovations such as network-based targeting and the fusion of intelligence with operational capability. For the purposes of this thesis, the SOF high-value target teams, as complete organizations, are within the system boundary.

This is based on the fact that the other organizations participating in the process are independent partners of the SOF high-value target teams.

2. System Interactions

Interactions between the proposed system and external systems are represented by need lines as shown in the External Systems Diagram seen in Figure 2. Each line describes an input to or output from the system. The process by which inputs are transformed into outputs facilitates the desired outcomes of the system.
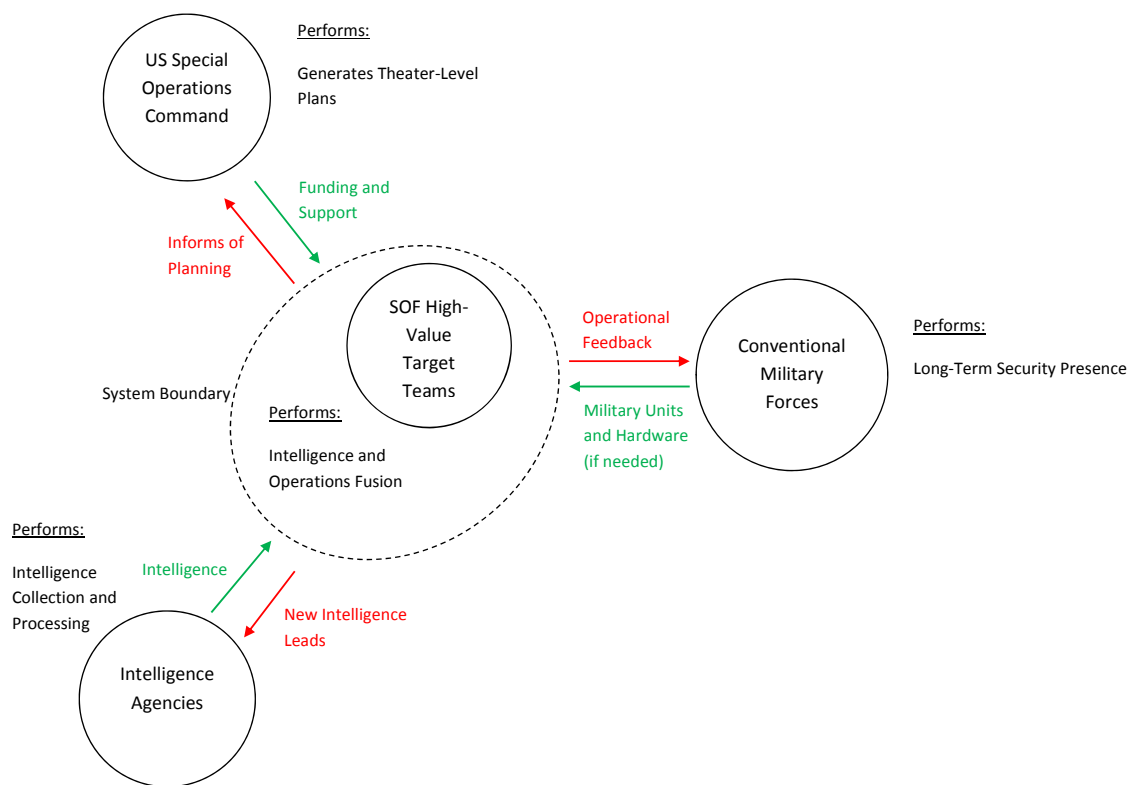

Figure 2.   SOF High-Value Target Team System Interaction Diagram

a. U.S. Special Operations Command (USSOCOM)

The funding and personnel management for the SOF high-value target teams is provided by USSOCOM. They ensure that the teams have all the required resources at their disposal in order to accomplish their missions. Additionally, by reporting to a separate chain of command, the SOF teams are able to bypass the

traditional military communication channels, further ensuring that their operations are not hindered by any bureaucratic delays.

b.   *Conventional Military Forces*

The military services, more specifically the U.S. Army and U.S. Marine Corps, provide additional manpower and security to the SOF high-value teams if needed. Although these forces do not usually accompany the SOF teams on their operations, they are always ready and close by should the need for reinforcements arise. Additionally, once the area is cleared by SOF teams, the conventional forces remain behind to provide security to the local population and continue the nation building process.

c.   *Intelligence Agencies*

Intelligence gathered for the SOF high-value target teams primarily comes from either federal intelligence agencies or the intelligence branches of the respective military branches and federal law enforcement agencies. This intelligence is used to create operational plans and refine existing intelligence.

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IV. FUNCTIONAL ARCHITECTURE

A. FUNCTIONAL DECOMPOSITION

In its most basic definition, a function is a process that takes an input and transforms it into an output. All of a system's top-level functions compose the functional architecture of the system. It is from the functional architecture that one can view the flow of inputs and outputs throughout the system. The process of actually determining the top-level functions of an existing system is called functional decomposition. Functional decomposition, also known as top-down structuring, starts with the top-level system functions and partitions them into several subfunctions (Buede, 2009, p. 218). All the inputs and outputs of the system must be accounted for with no new additions. The partitioning process continues until all outputs which need additional insight are identified. By resolving these organizations into their constituent parts, insight can be gained into the identity of key functional components.

The application of functional decompositions to JIATF-South and the SOF high-value target teams allows for the identification of key functions that are important in regards to successfully executing interagency coordination. Based on the mission and requirements of the JICTC, the relevant functions from JIATF-South and SOF high-value target teams are modified and used to create the functional architecture of the JICTC.

1. JIATF-South

The proposed top-level function of JIATF-South is to "Conduct Counter Illicit Trafficking Interagency/Partner Nation Coordination In Support of Law Enforcement." This function encompasses the entire mission of JIATF-South, beginning with receiving actionable law enforcement information, to compiling a case using interagency resources, deciding to commit interagency resources, and engaging in detection and monitoring operations. This top-level function can be decomposed into six subfunctions, as shown in Figure 3. Each of these proposed subfunctions follow a progressive flow of inputs and outputs. These subfunctions are composed of further

subfunctions that are not shown in Figure 3. Instead, they are presented in detail in Tables 3–8 to allow for detail descriptions of each subfunction.
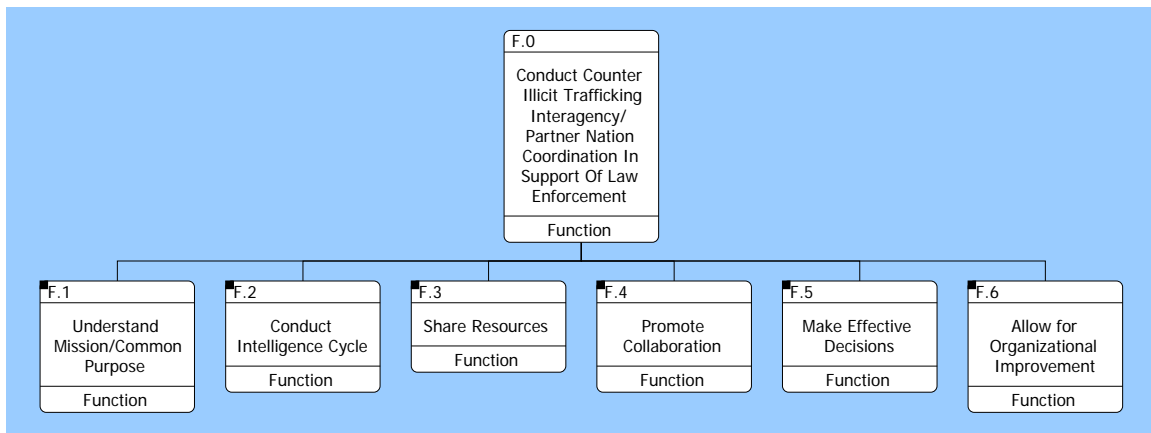
Figure 3.   JIATF-South Functional Architecture

a.   F.1 Understand Mission/Purpose

By sharply defining and understanding their mission, JIATF-South and its partners can concentrate all of their efforts and resources to accomplishing it. The lack of ambiguity in what the organization has been tasked to do gives it direction. The subfunctions are outlined in Table 3.

Function Number	Function Name	Function Description
F.1	Understand Mission/Common Purpose	A strong understanding of the mission/purpose unifies the organization and provides direction. Without it, there is a tendency to pursue only organizational objectives.
F.1.1	Define the Mission	The mission of JIATF-South needs to be clearly defined. Any ambiguity in what they have been tasked to do will not help them and their partners achieve their organizational goals.
F.1.2	Scope the Mission	The focus of JIATF-South activities should not take neither a too narrow nor too broad of a look. There is always a limited amount of resources provided by partners that must be used effectively.
F.1.3	Conceptualize the Desired End State	JIATF-South's desired end state should be defined and known to all partners in order that all activities will be conducted in support of achieving it.

Table 3.   JIATF-South Function F.1 Description

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b.   *F.2 Conduct Intelligence Cycle*

Intelligence drives operations at JIATF-South. With limited resources, JIATF-South cannot afford to have units under its tactical control conducting aimless searches across endless miles of ocean for smugglers. Instead, it specifically targets known smugglers and vectors with its assets to make interceptions based on intelligence. Raw intelligence is gathered from a wide variety of sources, especially law enforcement human intelligence where it is processed and analyzed at JIATF-South in order to determine if there is enough information to attempt an intercept. This function is further described in Table 4.

Function Number	Function Name	Function Description
F.2	Conduct Intelligence Cycle	Raw intelligence needs to be processed and analyzed to determine if there are any actionable information products present.
F.2.1	Process Intelligence	The translation, evaluation, and collation of raw intelligence materials is necessary prior to any detailed analysis.
F.2.2	Analyze Intelligence	Analysis establishes the significance and implications of processed intelligence, integrates it with previous information, and interprets the significance of any newly developed knowledge. A final intelligence product is created.
F.2.3	Disseminate Intelligence	The finished intelligence product is distributed to decision maker and relevant response forces for them to determine the next course of action or to take action.
F.2.4	Exploit Intelligence	New intelligence leads relevant to the mission that are discovered during the course of analysis are noted for future intelligence gathering operations.

Table 4.   JIATF-South Function F.2 Description

c. F.3 Share Resources

JIATF-South never receives all of the resources that it requests from its partners each year. As a result, it has to find a way to make its limited resources work efficiently and effectively. The subfunctions can be found in Table 5.

Function Number	Function Name	Function Description
F.3	Share Resources	Each participating agency and partner nation in JIATF-South brings unique resources/strengths to the table. It is through both the efficient and effective use of these resources that JIATF-South can be successful.
F.3.1	Create Plans for Resource Allocation	Resources will need to be utilized both efficiently and effectively. Both short and long term planning will be conducted.
F.3.2	Prioritize the Different Needs for Resources	The allocation of more limited resources will be done on a priority basis. Certain missions will need to be designated as a higher priority than others.
F.3.3	Coordinate Allocation of Resources	The movement of resources will need to be coordinated with the respective parent agency/partner nation.
F.3.4	Consolidate Multiple Resources	Consolidation of multiple resources will be conducted to promote efficiency and improve effectiveness.

Table 5.   JIATF-South Function F.3 Description

d. F.4 Promote Collaboration

Partners are attracted to JIATF-South as they know that their assets will be put to good use and that they will get the credit for any drug interdictions. They know that they can accomplish more by working with JIATF-South than they can by working independently. Table 6 illustrates how JIATF-South is the conduit through which all the relationships between partners are formed and maintained.

Function Number	Function Name	Function Description
F.4	Promote Collaboration	JIATF-South is a force multiplier that gives partner agencies and nations the ability to accomplish far more than they could by just operating by themselves. JIATF-South needs to ensure that collaboration continues in order to produce high return on investment for all partners thus ensuring their continued commitment.
F.4.1	Promote Networking of Information	JIATF-South will establish lines of communication so that information can be shared efficiently and effectively with all partners.
F.4.2	Nurture Long Term Relationships with Partners	The majority of the collaborative relationships between JIATF-South and its partners are built upon trust. Attributes such as transparency, respect, and politeness are all conducive of trust. All partners have to be accorded respect, regardless of the contribution their parent organization makes to JIATF-South as a whole. If trust is ever broken, it will take time to be rebuilt and productivity may suffer in the meantime.
F.4.3	Fuse Intelligence with Operations	By having actionable intelligence drive operations, the JIATF-South Intelligence and Operations Directorates will need to be able to communicate with each other rapidly.

Table 6.   JIATF-South Function F.4 Description

e.   F.5 Make Effective Decisions

Decision making at JIATF-South is done by consensus among partner agencies and nations. Every representative involved gets an equal amount of say in the matter. The resultant clash of diverse backgrounds and viewpoints is encouraged. The thorough debate and reconciliation of dissenting views is time consuming but ultimately improves the entire decision making process. Table 7 lists the subfunctions.

Function Number	Function Name	Function Description
F.5	Make Effective Decisions	JIATF-South brings together people with a wide array of backgrounds. The goal is to ensure that all of these diverse backgrounds are leveraged in such a manner to produce good and effective decisions.
F.5.1	Receive/Generate Operational Plans	The JIATF-South command team will receive day-to-day and sometimes minute-to-minute operational plans that were prepared jointly by the Intelligence and Operations Directorates. New plans will be generated as necessary.
F.5.2	Empower Organizational Representatives	Liaison officers from partner agencies should/must be empowered by their parent organization to make decisions that commit their agencies to action. Liaison officers from partner nations should similarly be able to speak for their governments.
F.5.3	Encourage Diverse Viewpoints	The diverse viewpoints at JIATF-South should promote and resolve "productive conflict" that improves the overall decision making process.
F.5.4	Achieve Consensus for Decision	Decisions should be made by consensus with all dissenting views being heard, openly considered, and resolved.

Table 7.   JIATF-South Function F.5 Description

f.   *F.6 Allow for Organizational Improvement*

Constant self-assessment of JIATF-South is important as the organization must be able to adapt and improve its operations quickly in order to continue to be effective in its mission. The subfunctions and their descriptions are listed in Table 8.

Function Number	Function Name	Function Description
F.6	Allow for Organizational Improvement	JIATF-South operates in a dynamic environment where the drug traffickers are trying to stay one step ahead of law enforcement. In order not to be rendered ineffective, JIATF-South needs to be able to learn quickly and adapt to changing situations.
F.6.1	Accept Organizational Feedback	JIATF-South must continually seek feedback on how it conducts its intelligence and operations missions.
F.6.2	Review Feedback	JIATF-South will analyze and review feedback in order to develop improvements that address any identified shortcomings or inefficiencies.
F.6.3	Implement Improvements to Organization	Improvements that have been developed need to be implemented in a timely manner.

Table 8.   JIATF-South Function F.6 Description

2.   SOF High-Value Target Teams

The proposed top-level function of SOF High-Value Target Teams is to "Conduct Counter Insurgency Interagency Coordination and Operations." This function encompasses the entire mechanism utilized by the high-value target teams to identify, track, and defeat terrorists and insurgent networks. This top-level function can be decomposed into four subfunctions as seen in Figure 4. Each of these proposed subfunctions follows a progressive flow of inputs and outputs.
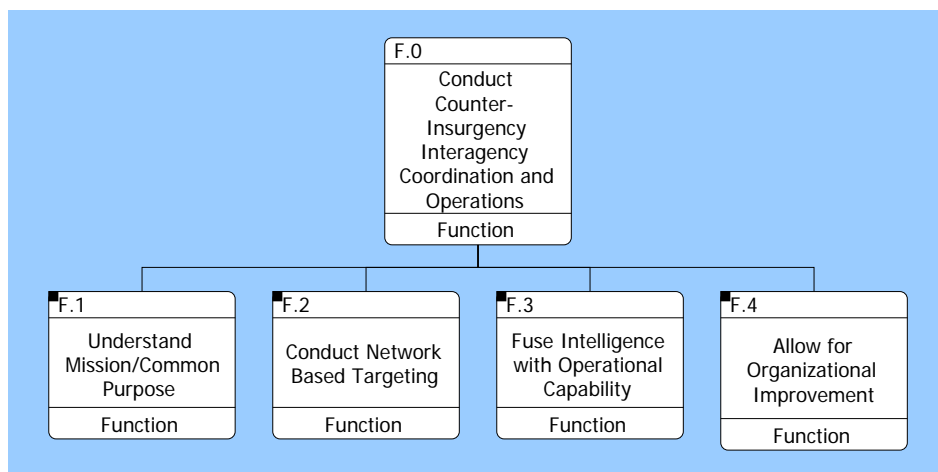
Figure 4.   SOF High-Value Target Team Functional Architecture

a. *F.1 Understand Mission/Common Purpose*

The sharply defined purpose held by high-value target teams gave them a unified direction and prevented individual organizations from straying and concentrating on its own goals and missions. Table 9 describes and summarizes the subfunctions.

Function Number	Function Name	Function Description
F.1	Understand Mission/Common Purpose	It is important to have a shared purpose (or vision or goals). Without it, team members tend to pursue their own organizational objectives while disregarding collaboration.
F.1.1	Communicate Desired End State	The knowledge of the desired end state needs to be known by everyone involved in the high-value target teams.
F.1.2	Commit to Achieve Desired End State	All members of the high-value target teams need to recognized their place in achieving the desired end state and ensure that all of their actions are in line with supporting it.

Table 9.   SOF High-Value Target Team Function F.1 Description

b. *F.2 Conduct Network Based Targeting*

Intelligence was the key to the specific targeting of terrorist and insurgent cells. SOF high-value target teams relied on intelligence to provide situational awareness of the local environment, social networks, key decision makers, and their motivations. From this, they could determine where and when it was best to conduct operations against a target for maximum effectiveness. This process is detailed in Table 10.

Function Number	Function Name	Function Description
F.2	Conduct Network Based Targeting	The targeting of specific terrorist and insurgent cells and their immediate supports in order to attack them. This approach is formalized in the F3EAD concept: find, fix, finish, exploit, analyze, and disseminate (Munsing & Lamb, 2011a, p. 33).
F.2.1	Find Target for Intelligence Collection	High-value target teams need a starting point for intelligence collection. The start point can be deliberate or opportunity based, and can focus on a known personality, a facility, an organization, or some other type of signature.
F.2.2	Fix Intelligence Assets on Target	The application of intelligence collection capabilities against a target (specific individual, organization, meeting place, etc.).
F.2.3	Conduct (Finish) Operations Against Target	High-value target teams shall conduct operations against the enemy. Operations may be kinetic (lethal, destruction) or non-kinetic (neutralization, disruption, etc.)
F.2.4	Exploit Captured Intelligence from Operations	The process of examining, analyzing, interrogating, and processing captured enemy personnel, equipment, and material for intelligence purposes
F.2.5	Analyze Newly Gathered Intelligence	Information gained from exploitation is turned into intelligence which can be used to drive new operations.
F.2.6	Disseminate New Intelligence	Any intelligence information collected from operations is disseminated widely throughout the intelligence enterprise to help eliminate intelligence stovepipes.

Table 10.   SOF High-Value Target Team Function F.2 Description

c.   *F.3 Fuse Intelligence with Operational Capability*

By bridging the gap between intelligence and operational capability, high-value target teams were able to place targets under an "unblinking eye" of surveillance. This persistent coverage of a target resulted in improved discrimination and lessened the chance of the target escaping. Additionally, intelligence analysts and operators developed a mutual appreciation for each other and realized how they could better serve each other. The subfunctions are described in Table 11.

Function Number	Function Name	Function Description
F.3	Fuse Intelligence with Operational Capability	High-value target teams operate in an environment where mission accomplishment can be directly linked to the speed of analysis and the rate of the targeting cycle. They need to ensure that they are organized in such a manner to promote this.
F.3.1	Share Resources	Each partner brings unique skills and resources to the organization that need to be used efficiently and effectively.
F.3.2	Promote Collaboration	High-value target teams need to advocate the need for partners to coordinate and collaborate with each other. No one agency has all of the resources or information to accomplish the mission.
F.3.3	Make Informed Decisions	High-value target teams need to make informed decisions via "mutual adjustment" between the intelligence analysts and the SOF operators.

Table 11.   SOF High-Value Target Team Function F.3 Description

d.   *F.4 Allow for Organizational Improvement*

As high-value target teams gained valuable experience and shared insights, it was important that they took the lessons learned and applied them right away. This understanding and learning contributed to the continued success of the high-value target teams. The derived subfunctions can be found in Table 12.

Function Number	Function Name	Function Description
F.4	Allow for Organizational Improvement	High-value target teams operate in a dynamic environment where terrorists and insurgents are trying to stay one step ahead of Coalition forces. In order to respond effectively, high-value target teams need to be able to adapt their tactics and techniques quickly.
F.4.1	Accept Organizational Feedback	High-value target teams must continually seek feedback on how it conducts intelligence and operations missions.
F.4.2	Review Feedback	High-value target teams will analyze and review feedback (lessons learned) in order to develop improvements that address any identified shortcomings or inefficiencies.
F.4.3	Implement Feedback	Improvements that have been developed need to be implemented in a timely manner.

Table 12.   SOF High-Value Target Team Function F.4 Description

B.   JICTC FUNCTIONAL ARCHITECTURE

An objective of this thesis is to establish both JIATF-South and the SOF high-value target teams as historical examples of successfully implemented interagency coordination organizations and subsequently develop functional, physical, and allocated architectures based on those organizations. These architectures are then to be used to satisfy the primary thesis objective of developing functional, physical, and allocated architectures for USEUCOM's JICTC. However, before the functional architectures developed for JIATF-South and the SOF high-value target teams can be leveraged to develop a JICTC functional architecture, several unique characteristics of the JICTC that differentiate its organizational structure and mission tasking from both JIATF-South and the SOF high-value target teams must be presented.

As outlined in its design concept, the JICTC's mission is to "support U.S. interagency efforts to counter illicit trafficking and terrorism and assist focus nations in building self-sufficient counter trafficking skills, competencies, and capacity" (United States European Command, 2011, p. 2). The JICTC will not actively participate in detection, monitoring, and interdiction operations on land or at sea. The primary goal of the JICTC is to promote and support the following three objectives:

1. Partner nations have an increased capacity to disrupt trafficking networks internally and regionally

    Currently, the U.S. government supports a number of programs to enhance border security, provide support to foreign law enforcement, and protect the integrity of partner nations. These programs are administered by a multitude of federal agencies which provides the possibility for duplication and redundancy of efforts. The JICTC intends to assist in the coordination and synchronization of these international capacity building efforts.

2. Interagency and international capacity building efforts are identified and consulted prior to new support initiatives

    Acting as a central node, the JICTC will ensure that there is appropriate interagency and international coordination for different projects and counter-trafficking efforts. It will be the embodiment of a whole of government/society approach to combating illicit trafficking.

3. Partner nations have an increased ability to manipulate and share information internally and regionally to counter trafficking and to insure cross-border management

    There is a need for common communication formats, frequencies, languages, and protocols in the international information community. The JICTC will seek to establish a regional standard for information sharing with USEUCOM components and international partners.

Based on this design concept, the proposed top-level function of the JICTC is "Conduct Interagency Coordination In Support of Efforts to Counter Illicit Trafficking." This function highlights the JICTC's mission of complementing existing international programs and assisting the international community to build self-sufficient national

capabilities to counter illicit trafficking. This top-level function and its subfunctions are illustrated in Figure 5.

Note that the previous functional decompositions of JIATF-South and SOF High-Value Target teams are used to develop specific subfunctions that are still applicable to the JICTC's mission.

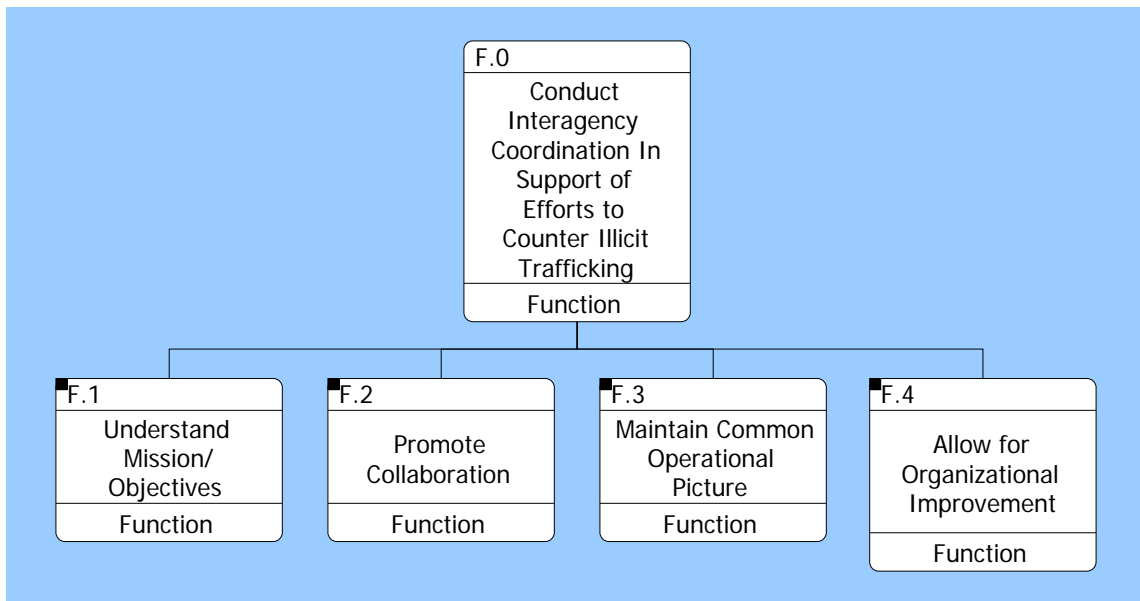Figure 5.   JICTC Functional Architecture

a.   F.1 Understand Mission/Objectives

This function is very similar to the ones found in the JIATF-South and SOF high-value target team decomposition. All the partners involved in the JICTC need to completely comprehend its purpose and mission in order to participate efficiently and effectively in the organization. This is further described in Table 13.

Function Number	Function Name	Function Description
F.1	Understand Mission/ Objectives	It is important to have a shared purpose (or vision or goals). Without it, team members tend to pursue their own organizational objectives while disregarding collaboration.
F.1.1	Define the Mission	The mission of the JICTC needs to be clearly defined. Any ambiguity in what it is designed to do will not help it and its partners achieve their respective organizational goals.
F.1.2	Conceptualize Desired End State	JICTC's desired end state should be defined and known to all partners in order that all activities will be conducted in support of achieving it.

Table 13.   JICTC Function F.1 Description

b.   *F.2 Promote Collaboration*

Like JIATF-South and SOF high-value target teams, the JICTC needs to encourage and promote collaboration between its partners. Without collaboration, it cannot accomplish its organizational objective. The subfunctions can be found in Table 14.

Function Number	Function Name	Function Description
F.2	Promote Collaboration	Collaboration is the short and long- term solution to matching various resources and authorities to maximize building counter trafficking competencies.
F.2.1	Build Long Term Relationships with Partners	The JICTC concept must be socialized among the interagency and international participants who may contribute to the success of the organization.
F.2.2	Assess Current Nation Building Efforts	JICTC will develop a baseline to determine the need for existing and/or planned counter trafficking support efforts.
F.2.3	Synchronize Current and Future Nation Building Efforts	JICTC will assist in the coordination and synchronization of interagency and international capacity building efforts to maximize the effects of the overall resource pool.

Table 14.   JICTC Function F.2 Description

c.   *F.3 Maintain Common Operational Picture*

In order to be cognizant of all nation building activities occurring in the USEUCOM AOR, the JICTC will need to maintain a common operational picture (COP). The process of maintaining the COP is similar to the intelligence gathering functions found in JIATF-South and SOF high-value target teams in the sense that information needs to be gathered, processed, and distributed to all concerned parties. Table 15 lists the required subfunctions.

Function Number	Function Name	Function Description
F.3	Maintain Common Operational Picture	JICTC will have situational awareness of all nation building efforts and activities being conducted by its partners.
F.3.1	Promote Networking of Information	JICTC will establish lines of communication so that information can be shared efficiently and effectively with all partners.
F.3.2	Receive Partner Information	Raw information will be collected, collated, and translated from partners.
F.3.3	Process Partner Information	The new information will be processed for significance and implications, integrated with previous information, and interpreted to determine the significance of any newly developed knowledge. Once completed, a final information product is created.
F.3.4	Disseminate Partner Information	The finished information product is distributed to decision makers and relevant parties for them to determine the next course of action.

Table 15.   JICTC Function F.3 Description

d.   ***F.4 Allow for Organizational Improvement***

Just like JIATF-South and SOF high-value target teams, the JICTC must have some sort of capability and organizational flexibility to allow for process improvement. This is essential for it to remain an effective organization in a fast-paced world. The subfunctions listed in Table 16 are similar to those of JIATF-South and SOF high-value target teams.

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Function Number	Function Name	Function Description
F.4	Allow for Organizational Improvement	JICTC operates in a dynamic environment where many nation building operations are being conducted in real time. In order to function effectively, the JICTC needs to be able to stay relevant and useful to all partners.
F.4.1	Accept Organizational Feedback	JICTC must continually seek feedback on how it conducts intelligence and operations missions.
F.4.2	Review Feedback	JICTC will analyze and review feedback (lessons learned) in order to develop improvements that address any identified shortcomings or inefficiencies.
F.4.3	Implement Feedback	Improvements that have been developed need to be implemented in a timely manner.

Table 16.   JICTC Function F.4 Description

V. PHYSICAL ARCHITECTURE

A. ANALYSIS OF SPECIFIC ENTITIES

The physical architecture is "a hierarchical description of the resources that comprise the system" (Buede, 2009, p. 252). It provides resources for every function identified in the functional architecture. Resources include the people, equipment, tools, tactics, techniques, policies, and procedures needed for the system to function. This traceability starts with the system's top-level components and continues down to the configuration items that define the physical elements of the system.

By analyzing how JIATF-South and SOF high-value target teams are actually physically organized and resourced, significant components necessary for successful interagency coordination can be identified. The relevant components can then be organized to form a physical architecture of the JICTC based on its mission and requirements.

1. JIATF-South

JIATF-South is organized into seven different directorates under the direction of a command group as seen in Figure 6 (A. McKee, personal communication, March 28, 2012). Each directorate fulfills a specific role in the organization and some provide unique assets to help JIATF-South accomplish its mission. The directorates are:

J1/J8 – Manpower, Personnel, and Resources

> The J1/J8 directorate is responsible for oversight of manpower, personnel, resources, and administration functions for all personnel stationed at JIATF-South.

J2 – Intelligence

> The J2 directorate supports JIATF-South with reliable and timely intelligence information. It provides appropriate prioritization, indications, and warnings for decision makers based on intelligence information.

J3 – Operations

The J3 directorate oversees the day-to-day operations by providing direction, control, and tasking of maritime and air assets that are under the tactical control of JIATF-South or partner agencies.

J4 – Logistics

The J4 directorate facilitates movement of mission critical components to JIATF-South assets. It uses all available logistics resources to maintain high levels operational readiness and effectiveness.

J5 – Plans and Policy

The J5 directorate develops policy, strategy, and long term plans with interagency and international partners for the purpose of building additional resources and capabilities.

J6 – Command, Control, Communications, Computers, Intelligence (C4I)

The J6 directorate provides and maintains the critical communications paths with partner agencies and nations. These paths enable both planning and operations to be conducted from JIATF-South.
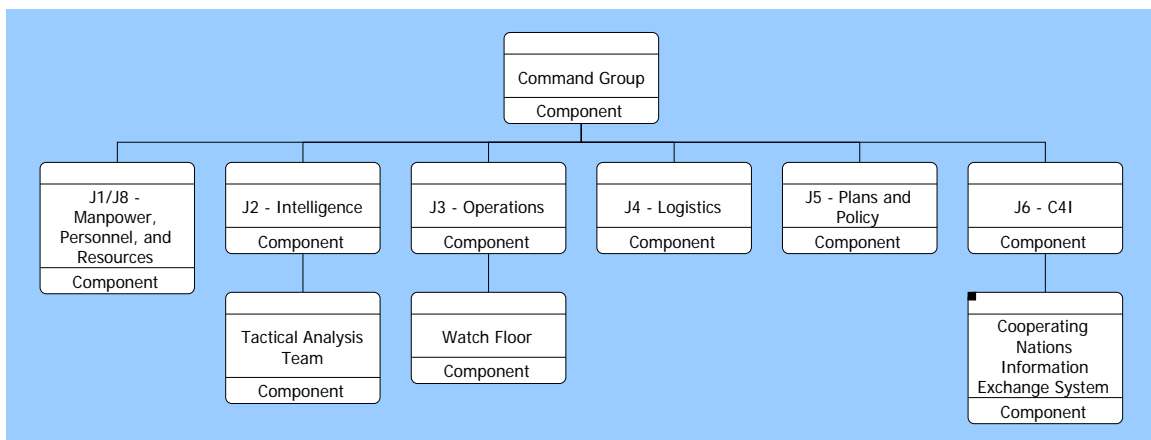

Figure 6.   JIATF-South Physical Architecture

Within the directorates, there are different sub-elements which contribute greatly to the success of the organization. For example, the Watch Floor (under the direction of the J3) is where the current day's operations are directed and monitored in real time. Besides the Watch Floor, there are two other major physical elements that are essential in order for JIATF-South to continue to be efficient and effective.

a.   Tactical Analysis Teams

Under the direction of the J2, Tactical Analysis Teams (TATs) are JIATF-South liaison officers embedded with Embassy Country Teams in South America. These teams, usually consisting of one to three JIATF-South intelligence officers, are permanently located inside American Embassies or Consulates and work side-by-side supporting the in-country law enforcement agency attachés. In total, approximately 10 percent of the JIATF-South staff is actually overseas serving in one of twenty TATs (A. McKee, personal communication, March 28, 2012). By being embedded with law enforcement efforts of the respective Country Teams, TATs have access to much more raw information than JIATF-South would typically get through normal intelligence sources. They are able to gain unique insights about the cultural and political aspects of the host nation. Additionally, the relationships that develop between the TATs and the in-country law enforcement attachés further enhance trust and collaboration between JIATF-South and its partners.

b.   Communications Infrastructures

The J6 at JIATF-South manages the vast array of communications networks including the Cooperating Nations Information Exchange System (CNIES). CNIES is composed of three major components:

1.   Partner Nation Network – An information portal that allows partner nations to immediately publish and share information via machine based simultaneous translations and a common repository (A. McKee, personal communication, March 28, 2012).

2. Command and Control Personal Computer – An unclassified COP where surface and air tracks of interest are filtered and transmitted to partner nations, thus providing them with better situational awareness (J. Cheng, personal communication, March 29, 2012).

3. SPARK Chat – A chat program with built in real time Spanish-English translation protocols which allows JIATF-South and partner nations to communicate in a chat environment (J. Cheng, personal communication, March 29, 2012).

CNIES provides JIATF-South and its partners state-of-the-art access to "information, know-how, and experts" along with providing "an easy way for members to feed important information back to their peers so knowledge that comes into the team can be monitored" (Munsing & Lamb, 2011b, p. 49).

2. SOF High-Value Target Teams

SOF high-value target teams were organized into two main entities: the SOF operators and the Intelligence Fusion Cell, as shown in Figure 7 (Munsing & Lamb, 2011a, p. 19). The typical U.S. Army Special Forces team consists of twelve men: a leader, a second in command, and two men for each of the five specialty areas (weapons, engineering, medical, communications, and operations/intelligence). Other SOF units include U.S. Air Force Combat Controllers and U.S. Army Rangers.
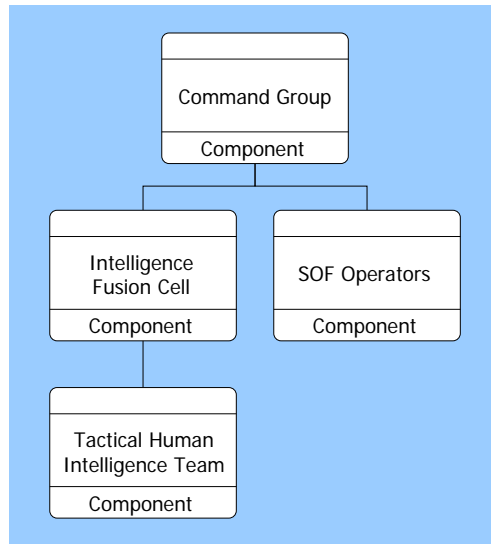
Figure 7.   SOF High-Value Target Team Physical Architecture

The Intelligence Fusion Cells were responsible for the fusion of all-source intelligence with operations. These cells made the SOF high-value teams as efficient and effective as they were. Unlike conventional military forces, who keep intelligence and operations planning separate, SOF high-value target teams integrated analysts with operators to ensure that there was a seamless transition between tracking and acting on a target. The practice of intelligence-operations fusion exploited interagency contributions by utilizing the vast resources and different strengths of partner agencies to expand the SOF high-value target team's capability to collect, analyze, and disseminate intelligence. Additionally, Tactical Human Intelligence Teams accompanied SOF operators on missions to assist in gathering raw intelligence and interrogating suspects. Any new information could then be quickly processed into actionable information to be acted upon immediately. By using intelligence to go on the offensive, SOF high-value target teams were able to place persistent pressure on terrorist networks until they were systematically dismantled.

B.   JICTC PHYSICAL ARCHITECTURE

As it is being organized from military roots, it makes sense that the JICTC should be organized by the J-Code structure similar to that of JIATF-South. By having the

numbered joint directorates named according to standard U.S. military convention, the JICTC will be able to quickly integrate itself with USEUCOM and other partner organizations. However, in order to be a true interagency organization, the command structure of the JICTC should not be all military personnel. Representatives from partner agencies should be integrated in various positions up and down the chain of command. Figure 8 illustrates a notional organizational structure of the JICTC as proposed by the author.

The JICTC should make full use of the JIATF-South TAT concept as a way to smoothly plug itself into the activities of the respective Country Teams and partner nations. The concept behind TATs can also be found in the SOF high-value target teams. The Tactical Human Intelligence Teams worked side-by-side with the operators on missions to gather and process intelligence in the field. These two examples illustrate how important it is to have analysts "out on the front lines" working with partner agencies. By embedding its own personnel in embassy teams throughout its AOR, the JICTC will have open and unfiltered access to partner information. This concept is a much less obtrusive solution to gathering information than to have each partner report their activities to the JICTC. These embedded teams place the burden of information gathering and reporting on the JICTC instead of on the partners.

With so many different countries and languages used in the AOR, the JICTC will need to establish common communications networks and protocols. Networking systems such as CNIES are useful tools that can increase collaboration and productivity.

Unlike JIATF-South, the JICTC does not currently require a Watch Floor. It does not monitor operations in real time. However, should the need ever arise for the creation of similar sub-element, it is recommended that it be placed under the direction of the J3.
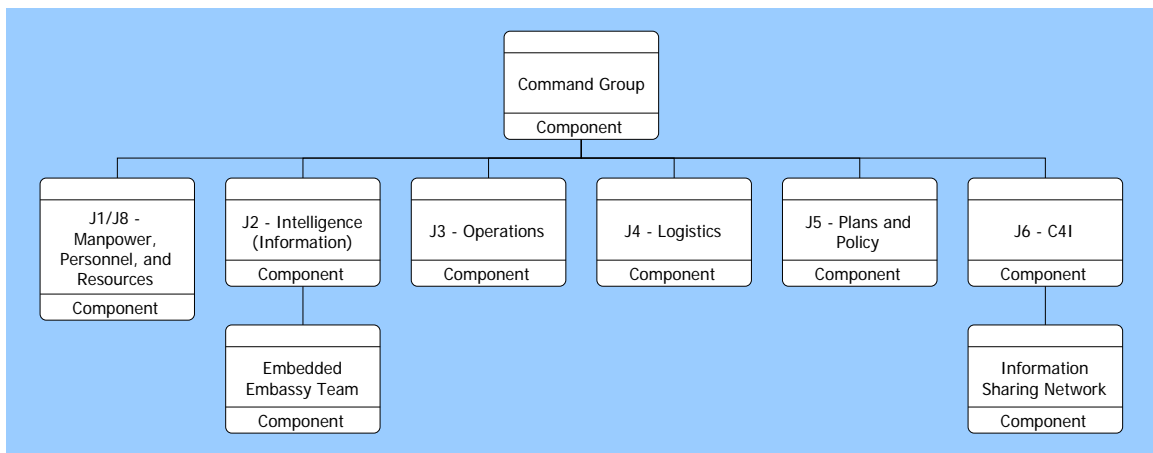
Figure 8.   JICTC Physical Architecture

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VI. ALLOCATED ARCHITECTURE

A. ANALYSIS OF SPECIFIC ENTITIES

The allocated architecture provides a complete description of the system design, including the functional architecture allocated to the physical architecture (Buede, 2009, p. 285). The allocation of functions to physical components ensures that the system being designed will function as specified and required. All functions must be mapped to at least one physical component and vice versa. The results of this mapping is seen in the tables later in this chapter.

This process of developing an allocated architecture has been "likened to peeling an onion" (Buede, 2009, p. 311) whereby the top level allocated architecture is completed before repeating the process at the next lower level. This repetition is continued until the required level of detail for the system is reached. For the purposes of this thesis, only top level functional and physical architectures were proposed. Therefore, the developed allocated architectures described below can address only these terms. For verification purposes, tables are used to demonstrate that all proposed system functions are satisfied by the proposed physical components.

To create a more complete allocated architecture, various trade studies and analyses need to be conducted. These studies include cost analysis, risk analysis, requirements validation, and trade-off analysis. There can be many solutions or variations to how a system should be organized and it is through comprehensive review that a successful allocated architecture can be created. For example, in the previous chapter, it was proposed that the JICTC be organized according to the military J-code structure. However, the organization and composition of the individually numbered J-code directorates was not addressed. It is here that analysis needs to be conducted to find the best solution given any requirements or constraints. Accordingly, some functional to physical component mapping may appear to be redundant at the top level but at lower levels, it may be shown to be necessary for organizational completeness.

Table 17 shows how each proposed subfunction correlates to an actual physical component at JIATF-South. All subfunctions are matched with a physical component. Note that the importance of various functions are not weighted. The importance of individual physical components cannot be determined alone from the raw number of functions that it is mapped to.

	Command Group	J1/J8 - Manpower, Personnel, and Resources	J2 - Intelligence	Tactical Analysis Teams (J2)	J3 - Operations	Watch Floor (J3)	J4 - Logistics	J5 - Plans and Policy	J6 - C4I
F.1 Understand Mission/Common Purpose									
F.1.1 Define the Mission	■								
F.1.2 Scope the Mission	■								
F.1.3 Conceptualize the Desired End State	■								
F.2 Conduct Intelligence Cycle									
F.2.1 Process Intelligence			■	■					
F.2.2 Analyze Intelligence			■	■					
F.2.3 Disseminate Intelligence			■			■			■
F.2.4 Exploit Intelligence			■		■	■			
F.3 Share Resources									
F.3.1 Create Plans for Resource Allocation					■	■			
F.3.2 Prioritize the Different Needs for Resources					■	■			
F.3.3 Coordinate Allocation of Resources					■	■			
F.3.4 Consolidate Multiple Resources					■	■			
F.4 Promote Collaboration									
F.4.1 Promote Networking of Information				■					■
F.4.2 Nurture Long Term Relationships with Partners		■		■				■	
F.4.3 Fuse Intelligence with Operations			■	■		■			
F.5 Make Effective Decisions									
F.5.1 Receive/Generate Operational Plans					■				
F.5.2 Empower Organizational Representatives	■	■			■				
F.5.3 Encourage Diverse Viewpoints	■				■				
F.5.4 Achieve Consensus for Decision	■				■				
F.6 Allow for Organizational Improvement									
F.6.1 Accept Organizational Feedback	■							■	
F.6.2 Review Feedback	■							■	
F.6.3 Implement Improvements to Organization	■							■	

Table 17.	JIATF-South Allocated Architecture

2.	SOF High-Value Target Teams

The allocated architecture of SOF high-value target teams can be found in Table 18. All proposed subfunctions are mapped to proposed physical components.

	Command Group	Intelligence Fusion Cell	Tactical Human Intelligence Team	SOF Operators
F.1 Understand Mission/Common Purpose				
F.1.1 Communicate Desired End State	■			
F.1.2 Commit to Achieve Desired End State	■			
F.2 Conduct Network Based Targeting				
F.2.1 Find Target for Intelligence Collection		■		
F.2.2 Fix Intelligence Assets on Target		■		
F.2.3 Conduct (Finish) Operations Against Target				■
F.2.4 Exploit Captured Intelligence from Operations		■	■	
F.2.5 Analyze Newly Gathered Intelligence		■	■	
F.2.6 Disseminate New Intelligence		■	■	
F.3 Fuse Intelligence with Operational Capability				
F.3.1 Share Resources		■		■
F.3.2 Promote Collaboration	■	■		
F.3.3 Make Informed Decisions	■	■		
F.4 Allow for Organizational Improvement				
F.4.1 Accept Organizational Feedback	■			
F.4.2 Review Feedback	■			
F.4.3 Implement Improvements to Organization	■			

Table 18.   SOF High-Value Target Team Allocated Architecture

B.   JICTC ALLOCATED ARCHITECTURE

The proposed allocated architecture of the JICTC seen in Table 19 is similar to that of JIATF-South due to the use of the J-Code structure. All proposed subfunctions are mapped to proposed physical components.

	Command Group	J1 - Manpower and Personnel	J2 - Information (Intelligence)	Embedded Embassy Team (J2)	J3 - Operations	J4 - Logistics	J5 - Plans and Policy	J6 - C4I
F.1 Understand Mission/Objectives								
F.1.1 Define the Mission	■							
F.1.2 Conceptualize Desired End State								
F.2 Promote Collaboration								
F.2.1 Build Long Term Relationships with Partners		■					■	
F.2.2 Assess Current Nation Building Efforts							■	
F.2.3 Synchronize Current and Future Nation Building Efforts			■	■	■	■	■	
F.3 Maintain Common Operating Picture								
F.3.1 Promote Networking of Information								■
F.3.2 Receive Partner Information			■	■				
F.3.3 Process Partner Information			■	■				
F.3.4 Disseminate Partner Information			■	■				■
F.4 Allow for Organizational Improvement								
F.4.1 Accept Organizational Feedback	■							
F.4.2 Review Feedback	■							
F.4.3 Implement Improvements to Organization	■							

Table 19.   JICTC Allocated Architecture

VII. CONCLUSION

A.   KEY POINTS

This thesis addressed three research questions:

1. How can the use of Systems Engineering methods and tools improve interagency coordination?

2. Can Systems Engineering be used to develop a generalized functional and physical architecture of JIATF-South and SOF high-value target teams?

3. How can the use of the generalized functional and physical architecture based on JIATF-South and SOF high-value target teams be applied to the USEUCOM JICTC?

By applying Systems Engineering to interagency coordination, a greater understanding of the organization as a whole can be achieved. From this, there is the potential to replicate successful aspects to other organizations. Additionally, existing interagency organizations can benefit from the use of Systems Engineering by using it to gain a better understanding of how they interact and operate within the organization.

Using Systems Engineering methods and tools, this thesis analyses two successful examples of interagency coordination and subsequently used them to develop a generalized architecture for the JICTC. These two organizations were first examined utilizing functional decomposition in order to better understand their top-level functions. Next, the physical organization and structure of the two examples were documented. Finally, the decomposed functions were allocated to the physical components to complete the analysis. Based on the design concept of the JICTC, key functions and organizational methods identified from the previous analysis were applied to construct a notional functional and physical architecture for the JICTC. These architectures were verified for completeness in the notional JICTC allocated architecture.

From this thesis, it is demonstrated that the Systems Engineering process can be adapted to analyze organizations. This thought process is useful in indentifying the

necessary functions and physical components needed to fulfill an organization's mission and requirements. Without it, there is the possibility of overlooking important aspects of an organization.

B. RECOMMENDATIONS

The notional functional, physical, and allocated architectures of the JICTC bear a slight resemblance to those of JIATF-South. This is to be expected as both organizations were created with the intent to coordinate various government agencies in countering illicit trafficking. However, the different AORs of these two organizations result in two very different mission sets. JIATF-South is centered around using interagency and partner nation coordination to strengthen its "detection and monitoring" mission in support of law enforcement. The JICTC utilizes interagency coordination to identify capability gaps and synchronize nation building efforts.

The most important takeaway from the analysis of JIATF-South and SOF high-value target teams was their common use of embedded intelligence analysts. The TATs from JIATF-South and Tactical Human Intelligence Teams on the SOF high-value target teams provided an organic intelligence processing capability "out on the front lines." Neither JIATF-South nor the SOF high-value target teams had to rely on the external intelligence community to provide them with the desired actionable information. Rather, the TATs stationed at American Embassies assist law enforcement and the Tactical Human Intelligence Teams accompany the SOF operators provide their respective organizations relevant and up-to-date information as soon as it became available. By also implementing the use of embedded intelligence/information teams, the JICTC will have access to greater amounts of relevant information regarding the activities of its partner agencies and nations. These teams will allow the JICTC better achieve its mission.

C.   AREAS TO CONDUCT FURTHER RESEARCH

As mentioned in the previous chapter, this thesis only addresses the top level functions and physical components of interagency coordination. As a result, the allocated architecture does not go into any further level of detail. Further work can be conducted regarding the use of actual trade studies and analyses needed to create further sub-levels of the allocated architecture. Additionally, as the JICTC has already gained operational capability, opportunities exist to examine how it is currently organized as compared to the notional architecture outlined in this thesis. Opportunities also exist to examine other interagency organizations using a similar Systems Engineering methodology.

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